

# The concept of an interoperability framework

*How to achieve this in practice*

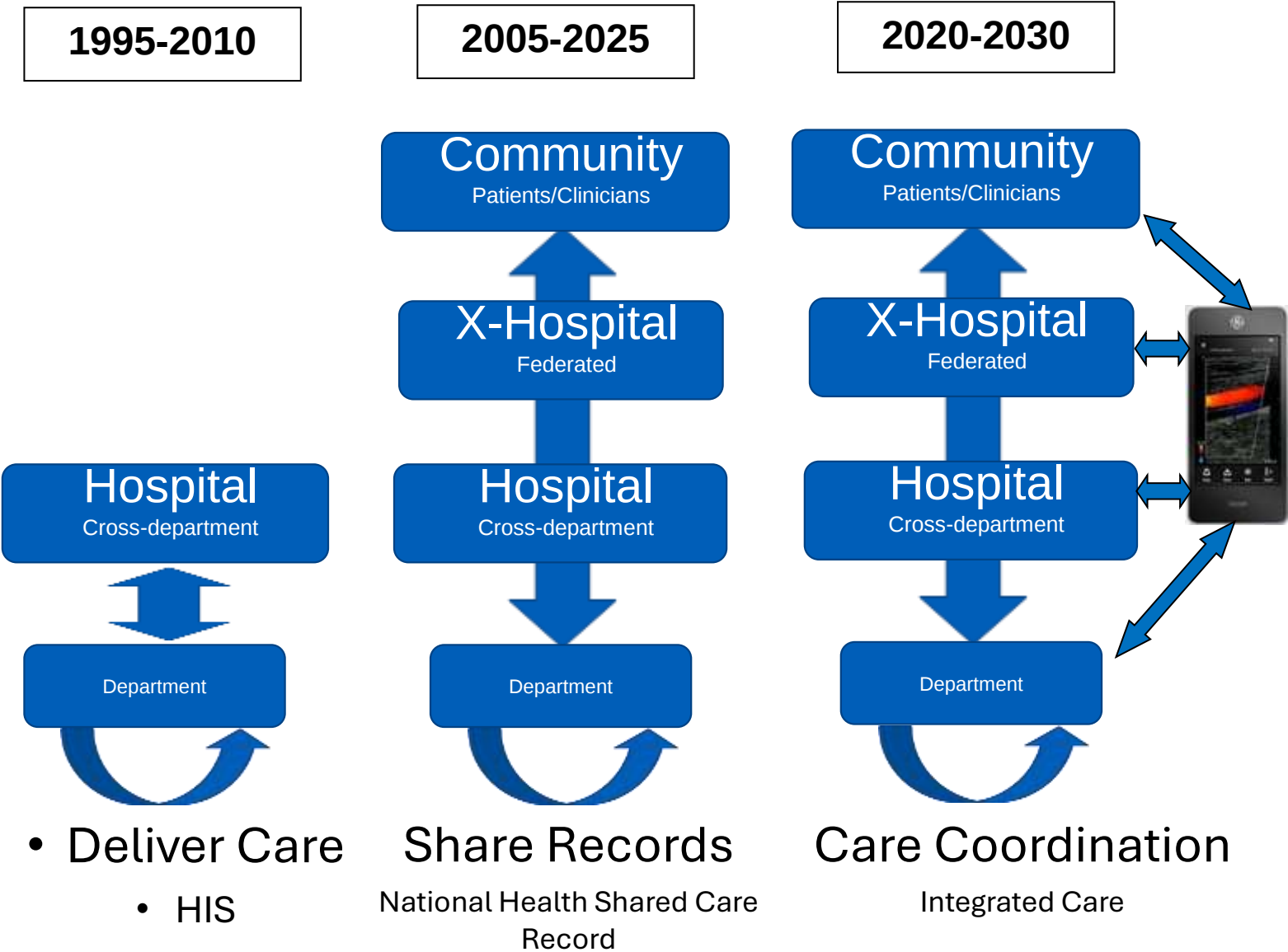


**Jürgen Brandstätter**  
IHE Catalyst



# The basics

# Evolution and role of Information Exchange in Healthcare



**Reuse of Data – Cross Border**

European Health Data Space  
WHO Smart Vaccination Certificate

# As it started in Europe



**First eHealth large scale deployment:** European Patient Smart Open Services

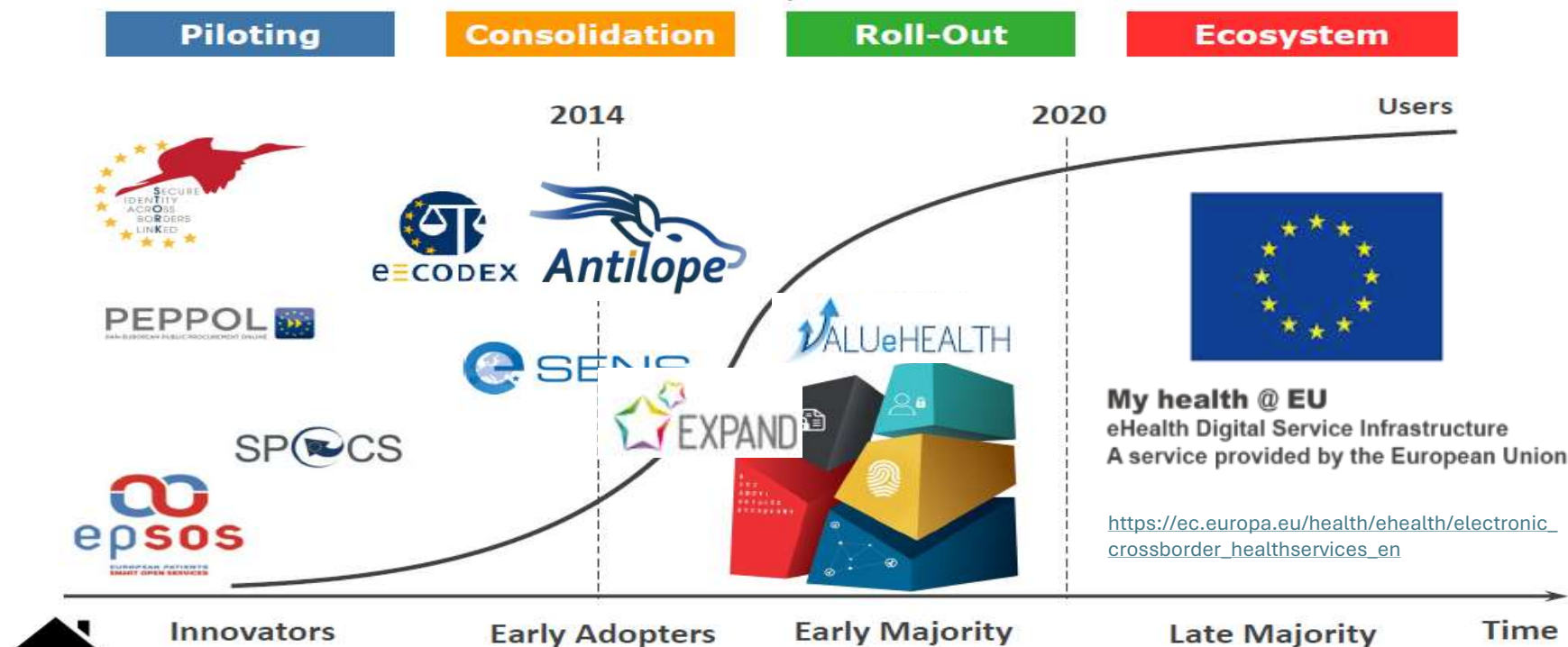
2008 – 2014

36,5 Mio € spent

25 European countries

Creating a #DigitalSingleMarket

The building blocks represent a massive investment since their creation by the Large Scale Pilots. As their user base grows, the Commission is already working on their sustainability beyond CEF.

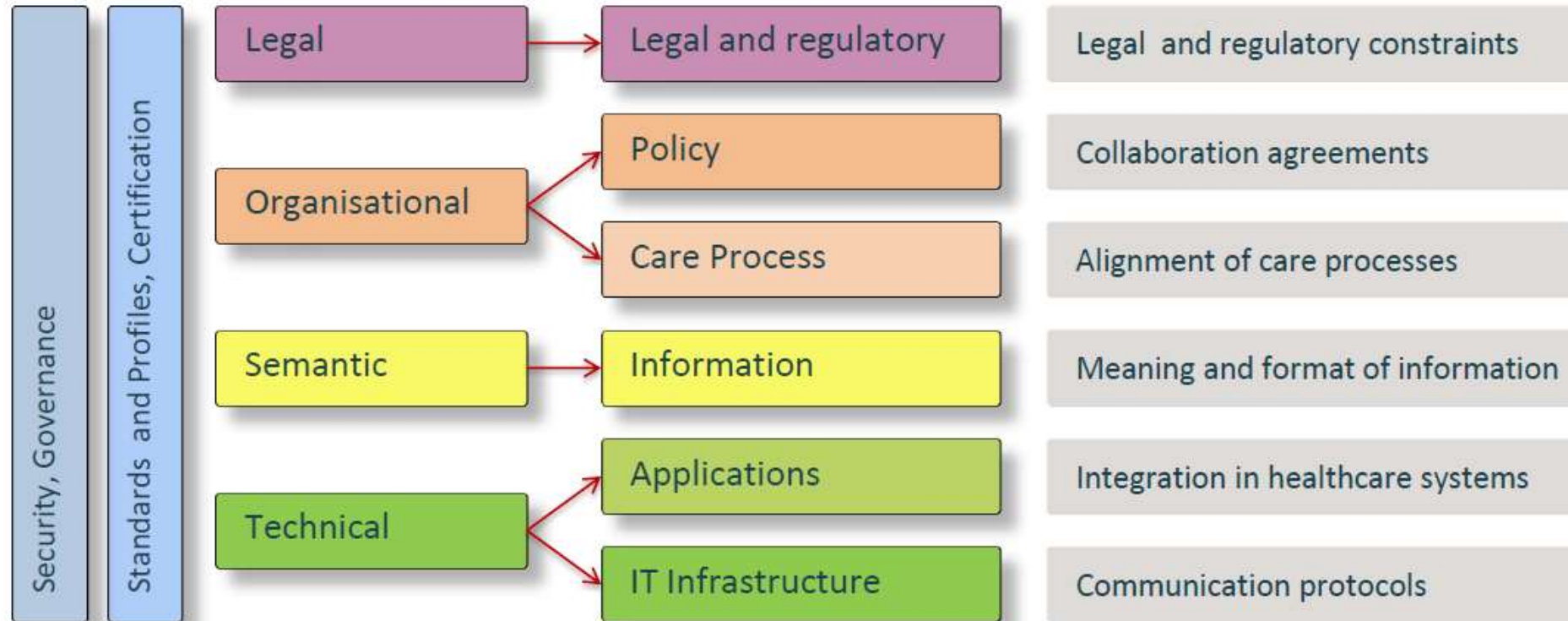


# Antilope EU project



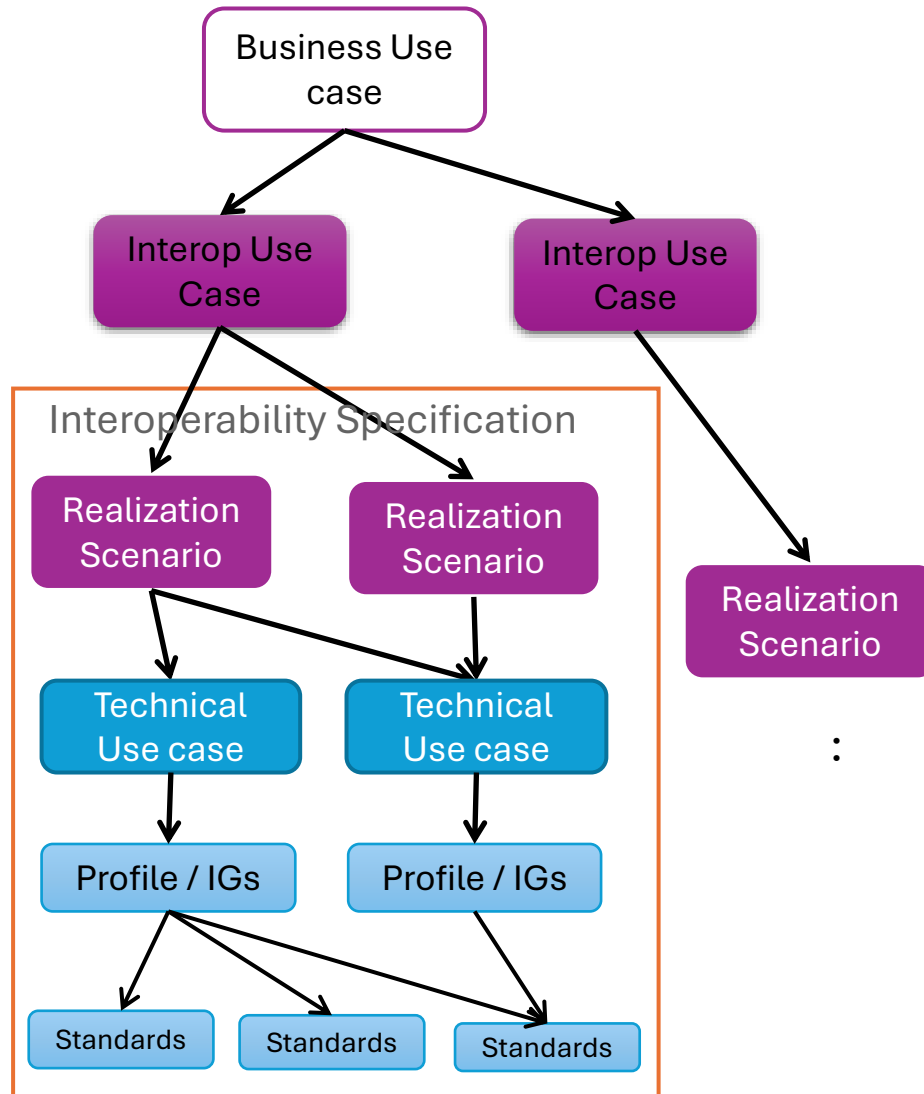
<https://www.antilope-project.eu>

# Refined eHealth European Interoperability Framework



[https://health.ec.europa.eu/document/download/7cc56460-46ea-4fd7-9064-ac1a14a2a14e\\_en](https://health.ec.europa.eu/document/download/7cc56460-46ea-4fd7-9064-ac1a14a2a14e_en)

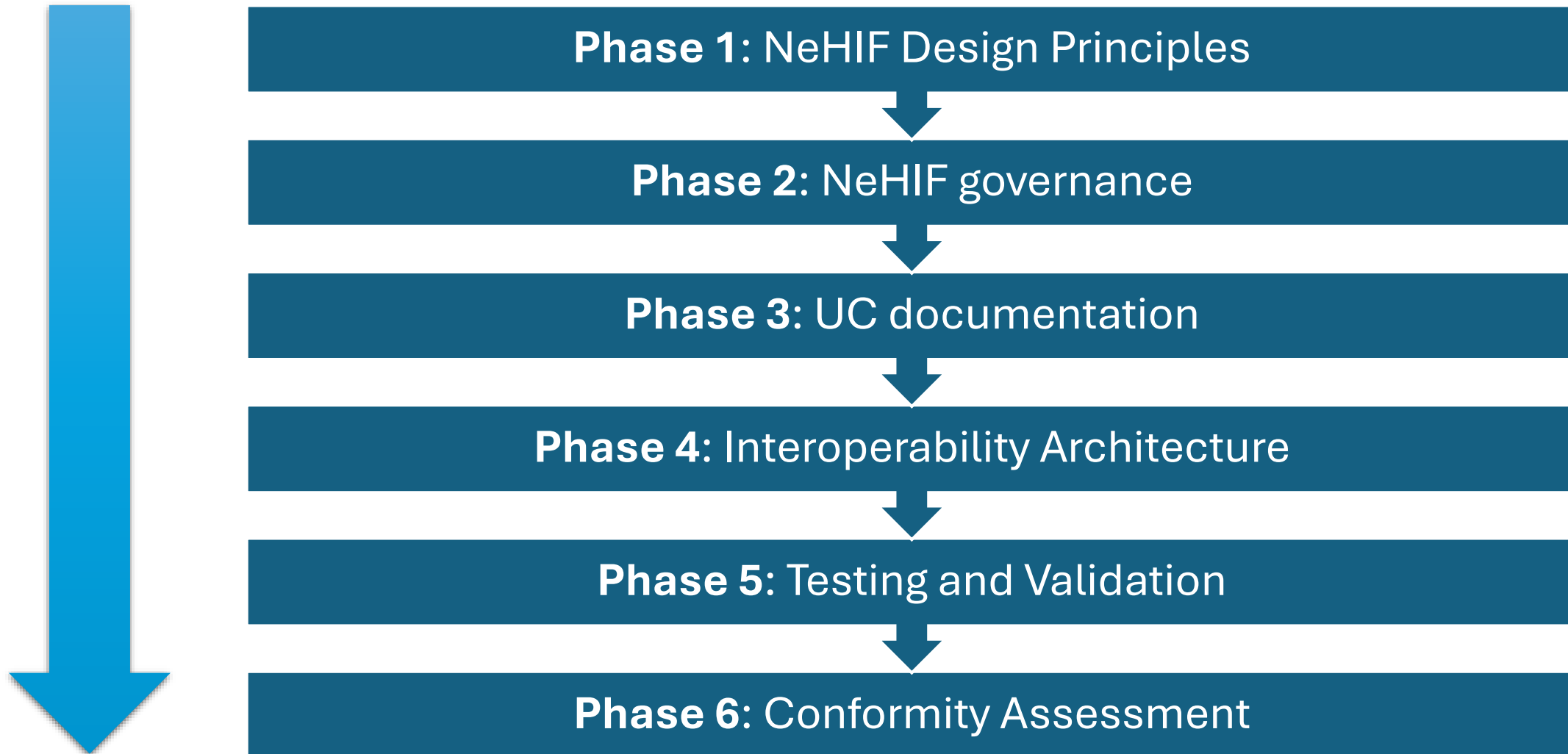
# Use-case driven approach



- Paper by IHE-Europe
  - *Use-case driven approach for a pragmatic implementation of interoperability in eHealth*
- EU Antilope project
  - <https://www.antilope-project.eu>
- Use-case repository
  - <https://usecase-repository.ihe-europe.net>

# The steps

# Roadmap towards a National eHealth Interoperability Framework



# 6 phases to get to a NeHIF



- **Phase 1: NeHIF Design Principles**

- *NeHIF design principles will be established, following a process of Use Case (UC) prioritization in conformance with EU eHealth interoperability framework policies*
- Assessment of appropriate models through site visits, workshops
- Prioritize the Use Cases (UC), according to the Refined eHealth Interoperability Framework (ReEIF)

- **Phase 2: NeHIF governance requirements definition and agreement**

- *Define governance requirements for building a sustainable NeHIF that ensures consensus among eHealth ecosystem stakeholders*
- Include: Policy makers, health care providers, public funders, education and research, start-ups, SMEs and large companies, associations

# 6 phases to get to a NeHIF



- **Phase 3: Finalize UC documentation and reference UC analysis**
  - *Select Use Case(s) to implement out of the prioritized list of Outcome 1*
  - Through in-depth analysis
  - Roadmap and schedule of UCes implementation
- **Phase 4: Architecture and specification definition for the Use Cases selected**
  - *An overall national interoperability architecture will be developed defining the set of common components needed*
  - Development of **Interoperability specifications**
  - Technical workshops and Training

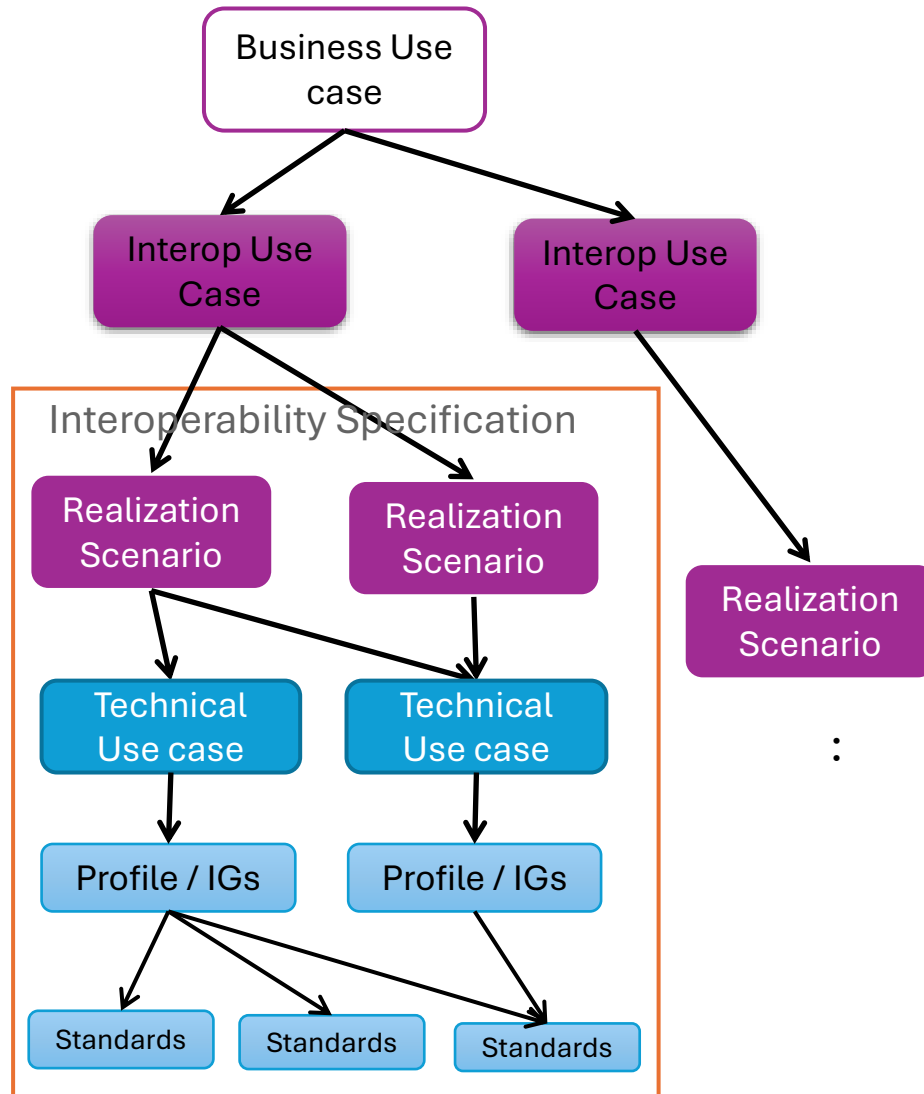
# 6 phases to get to a NeHIF



- **Phase 5: Testing and validation of the UCes selected through a “Projectathon”**
  - *Implement and test in practice the interoperability specification of Outcome 4*
  - Define Testing Strategy
  - Organize and run Projectathons
    - Refine specification, train stakeholders on testing
- **Phase 6: Conformity assessment model definition & regulatory framework**
  - *Focus on two main regulatory needs to ensure the sustainability of both the NeHIF and the National eHealth strategy:*
    - *establishing a national reference center for testing and certification*
    - *provide the needed recommendation for regulatory and legal needs*
  - Analyse and identify regulatory and legal issues

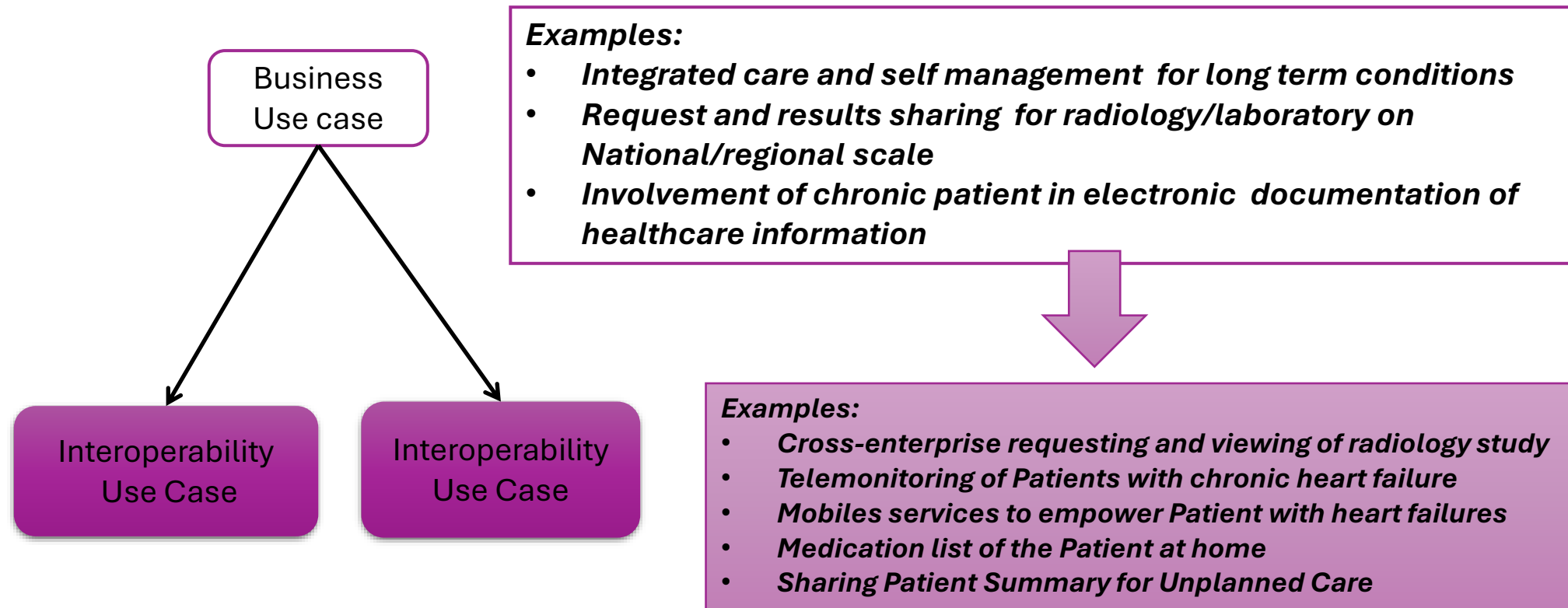
# The use-cases

# Use-case driven approach

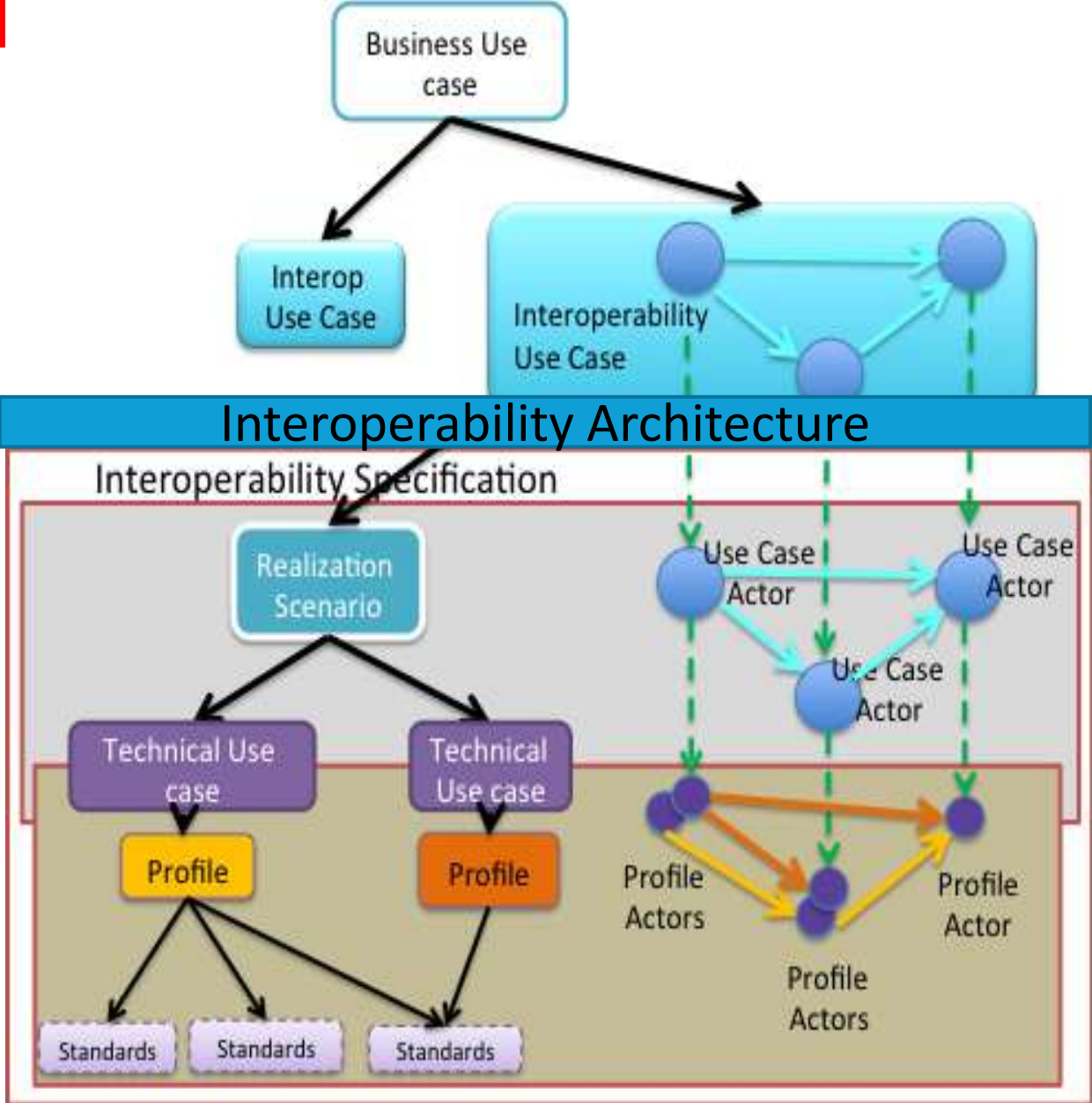


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# Business cases and interoperability use cases



# Interoperability Functions



Interoperability Use Case  
Uses Cases to be defined that include interoperability functions

Interoperability architecture

Realisation scenarios and Interoperability Specifications

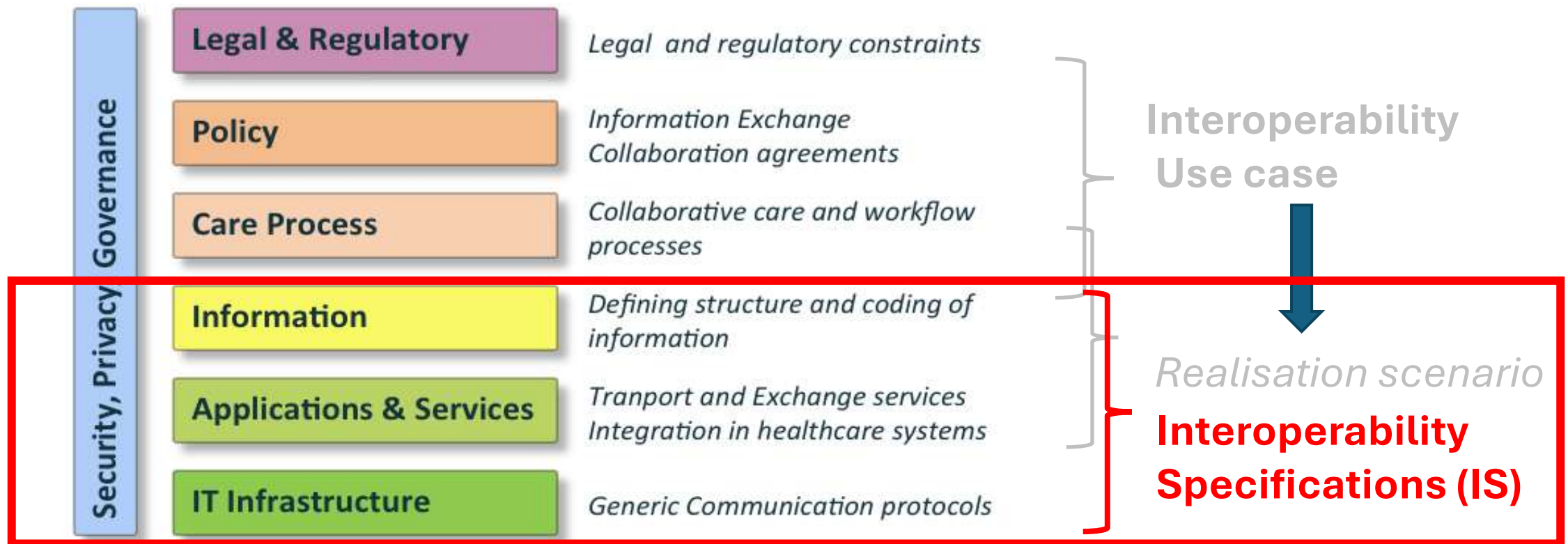
TESTING Strategy

# Interoperability is not a simple concept ... IHE



From Refined ehealth European Interoperability Framework  
EU eHealth Network, 23/10/2015

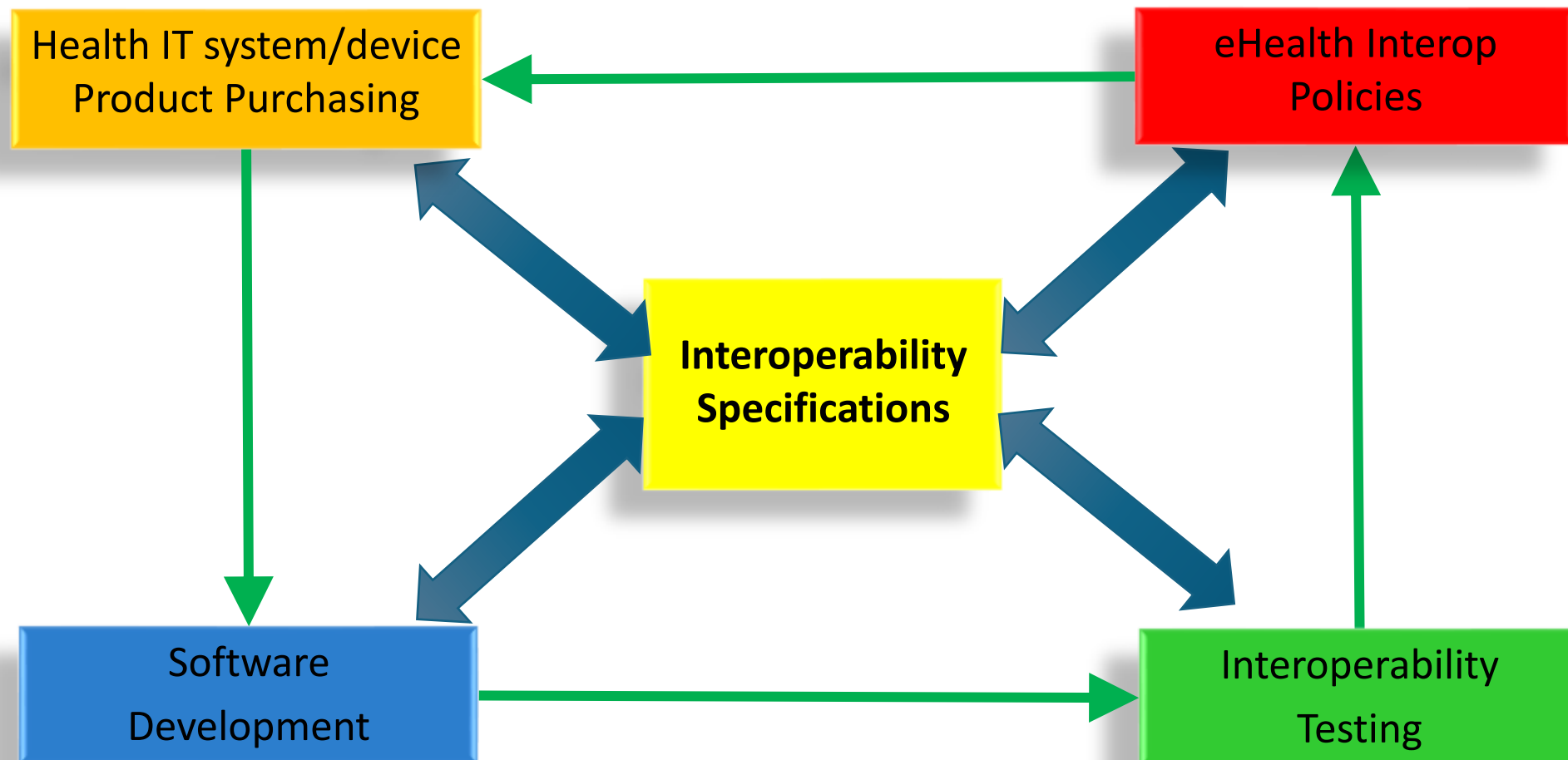
# Interoperability is not a simple concept ... IHE



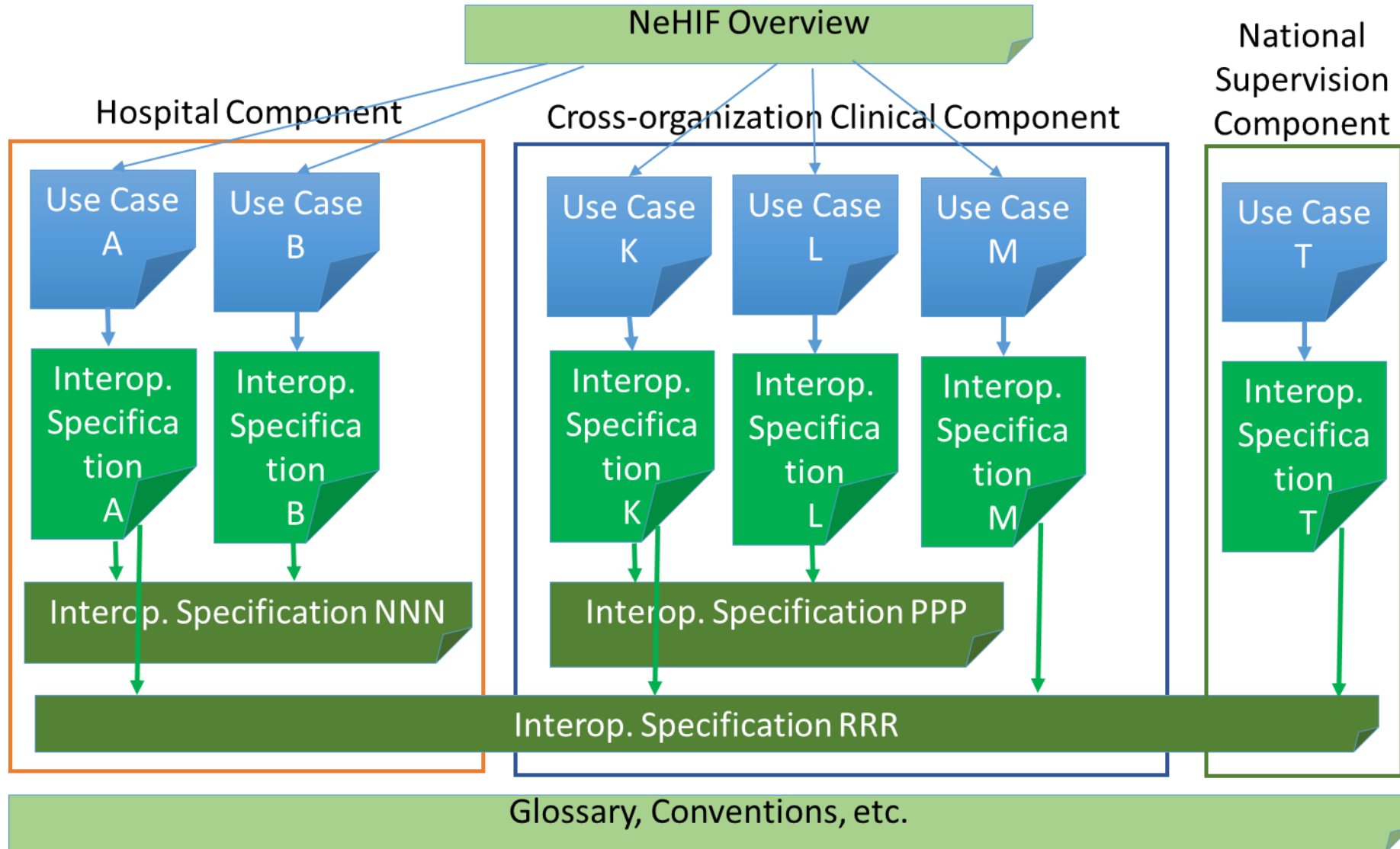
From Refined ehealth European Interoperability Framework  
EU eHealth Network, 23/10/2015

# Critical Role of Interoperability Specifications

Interoperability “referee” – Closes the loop



# Overview of a National eHealth Interoperability Framework



# Exceptional interruptions

- Phase 1: NeHIF Design Principles
- Phase 2: NeHIF governance requirements
- Phase 3: Use Case (UC) documentation and reference UC analysis

**Country is not ready for the approach!**  
(Politically, economically, ...)

→ Needs educational consultancy

**Foundational use-cases not deployed** e.g.  
PatIndex, HCP Index, etc.

→ Needs to be done! Raises time & effort!

- Phase 4: Architecture and specification definition for one Use Case
- Phase 5: Testing and validation of one UC through a “Projectathon”
- Phase 6: Conformity assessment model definition & regulatory framework

**Use-case does not have a „blueprint“**

**Blueprint**



→ needs creation first!  
(together with SDO community)

# Exceptional interruptions

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- Phase 2: NeHIF governance requirements
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**Please don't  
take the shortcut  
!!!**

# The standarization

# Why standards?



**IT Systems of different vendors** need to **exchange data** which shall be **semantically understood** to fulfill a certain **use-case**

**To accomplish this, we need standards!**

**How** do they communicate (protocol)

**What** do they communicate (content)

- Healthcare professionals work with industry
  - Coordinate implementation of standards to meet clinical and administrative needs
1. Clinicians and HIT professionals identify the key interoperability problems they face
  2. Providers and industry work together to develop and make available standards-based and tested specifications
  3. Implementers follow common guidelines in purchasing and integrating effective systems



***IHE: A forum for agreeing on how to implement standards and processes for making it happen***

# What it is about?

**CONVERGENCE**

**Standards**

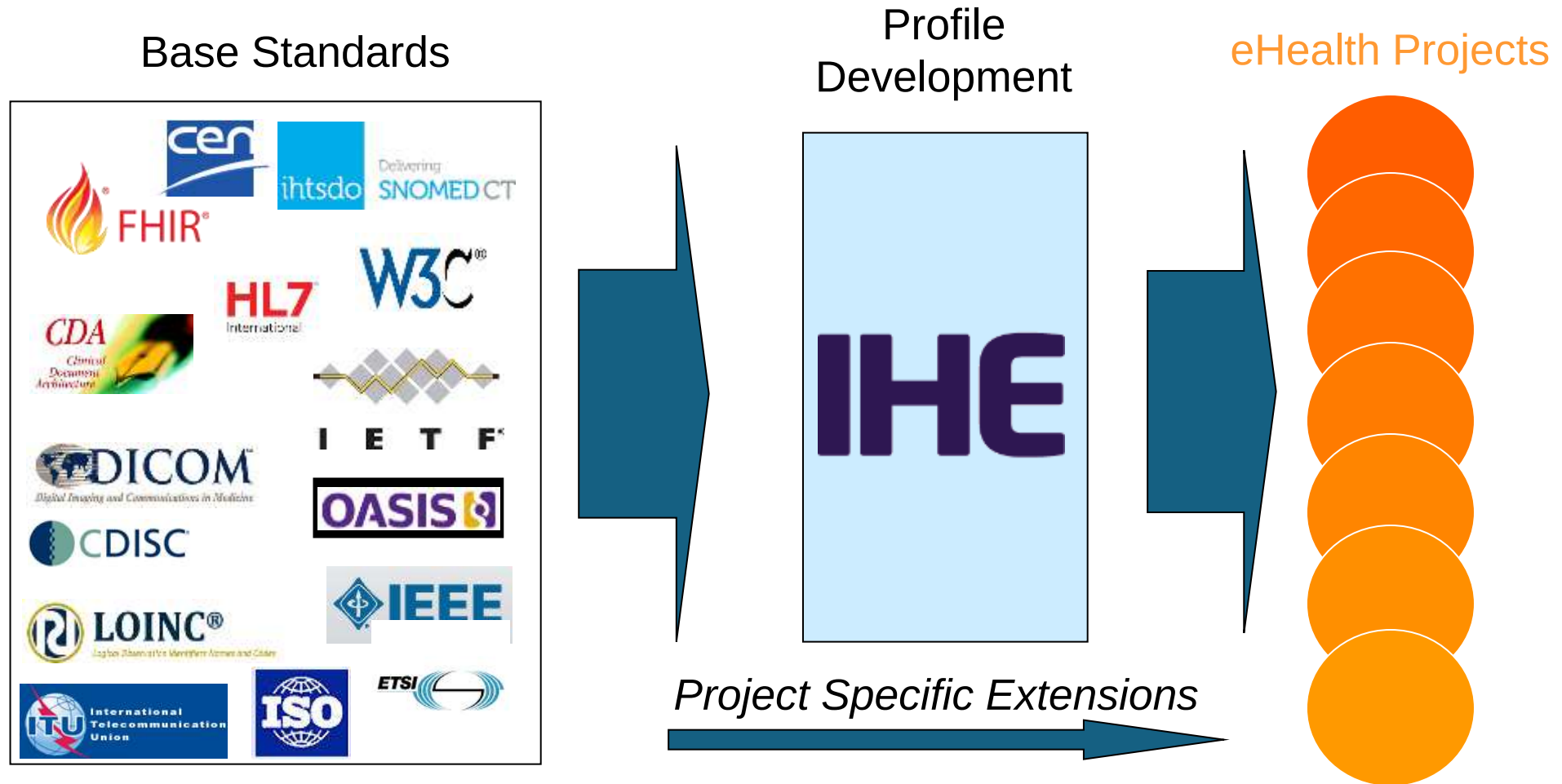
and



Implementation Guides on **how to**  
**use them**

# Interoperability: From problem to solution IHE CATALYST

IHE is a **non-profit** SDO which uses „**existing**“ standards to profile Interoperability use-cases



## Process Standards

Regulate „how“ information is shared

*Transport and workflow*

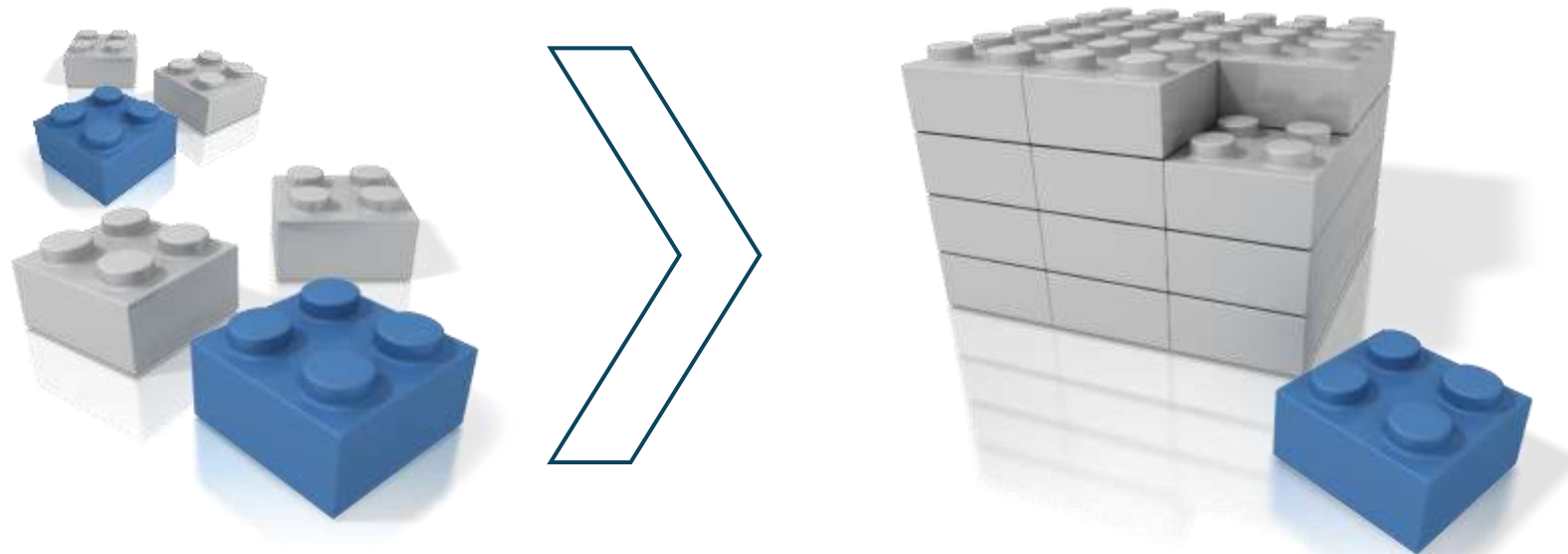
**Use-case** in practice requires both  
loosely coupled – or – tightly interacting

## Content Standards

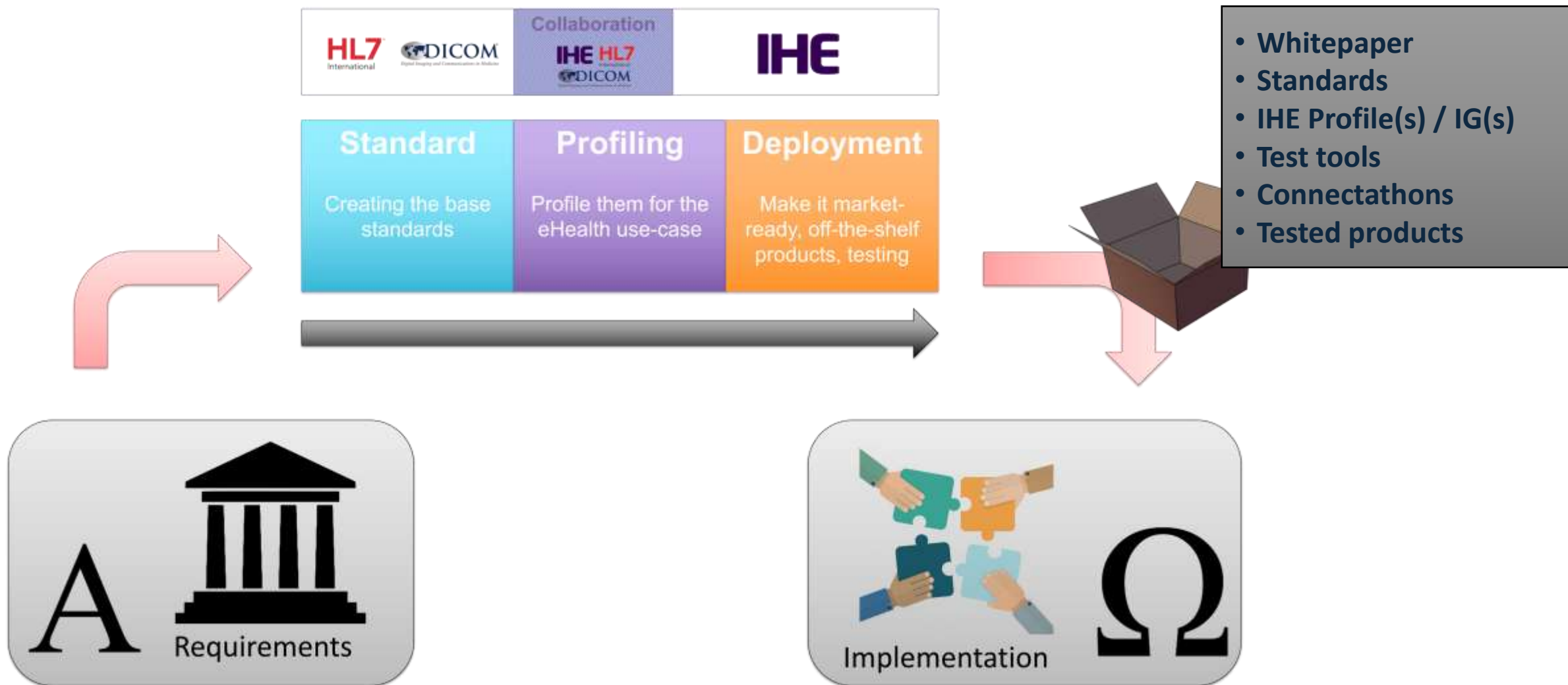
Regulate „which“ information is shared

*Information elements and Terminologies*

**IHE profiles are the building blocks for Digital Health**

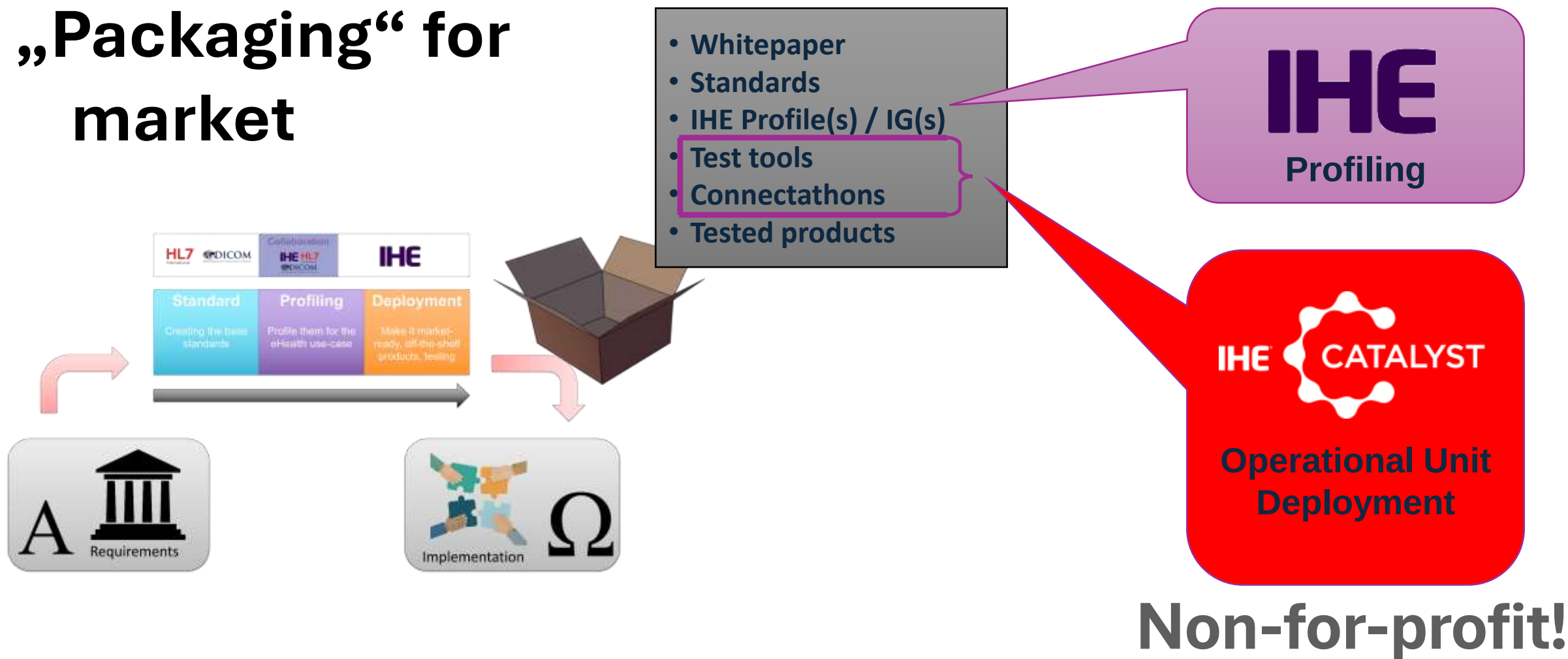


# Standards Development pipeline



# Standards Development pipeline

## „Packaging“ for market



# IHE Profiles for HIE



## Documents

(CDA, FHIR)

## Data

(FHIR resources)

### Mature

PIX

PDQ

XDS

XDS-I

MHD

XCA

XCA-I

ATNA

### At start

PIXm

PDQm

MHDS

WIA / WADO-RS

RestfulATNA

IPS

### Future

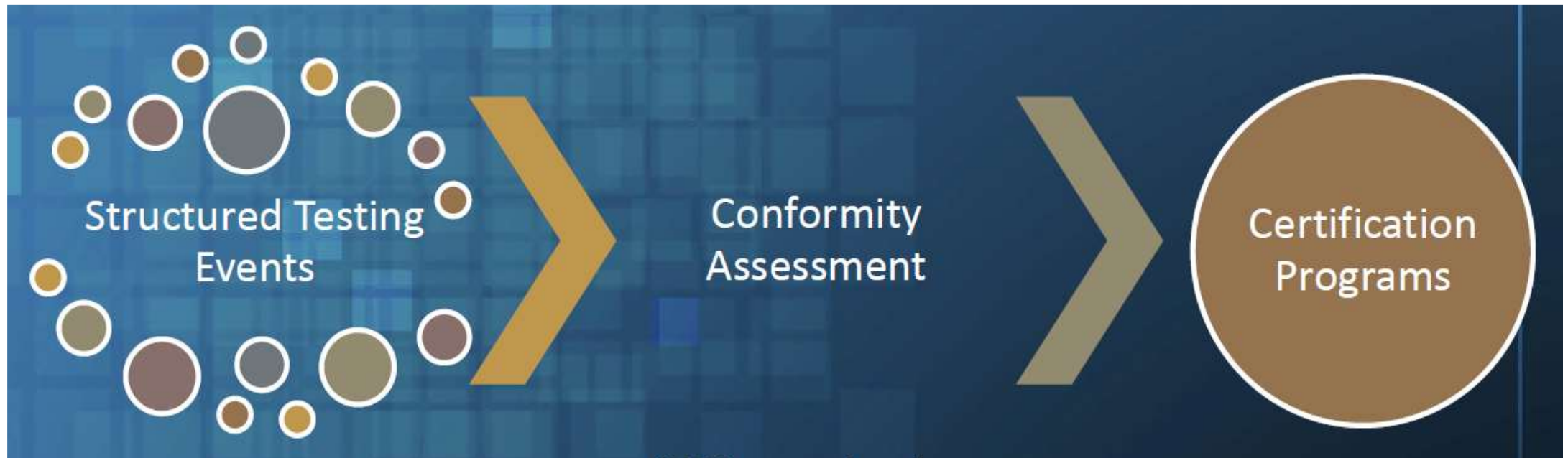
Medication Prescription  
and Delivery (MPD)

Verifiable Health Links  
(VHL)

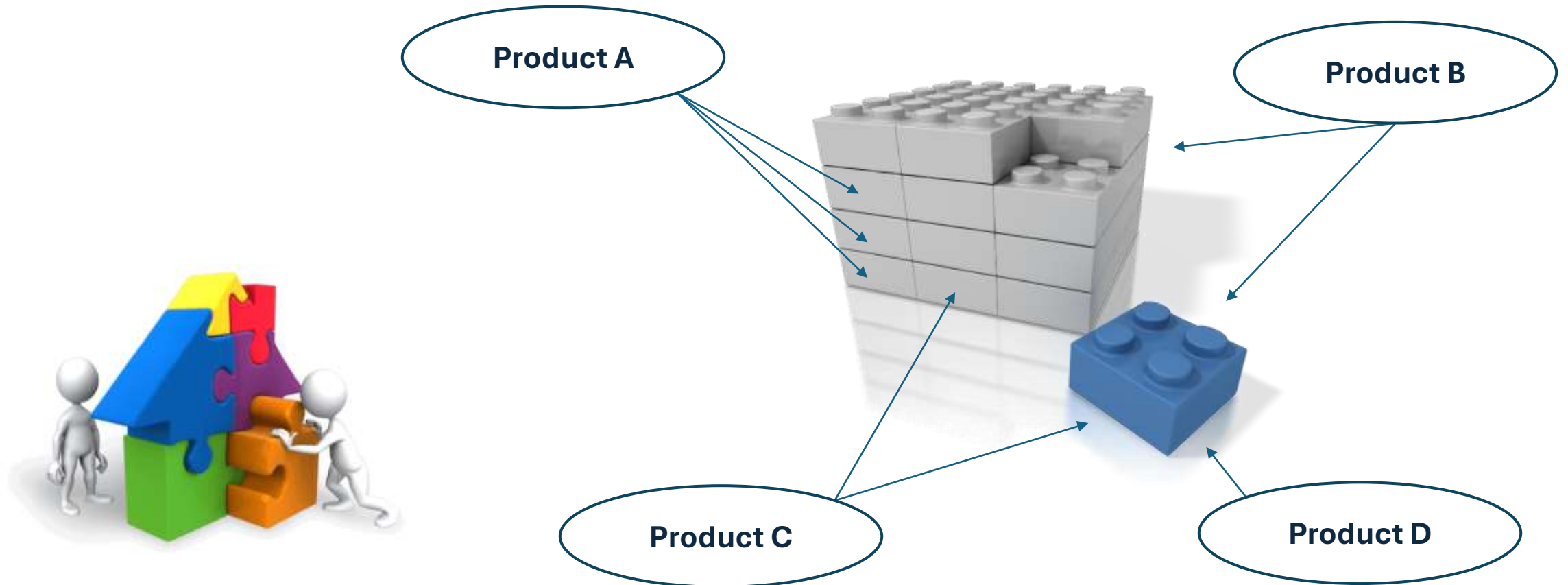
FHIR Laboratory Report

FHIR Imaging  
Diagnostic Report (IDR)

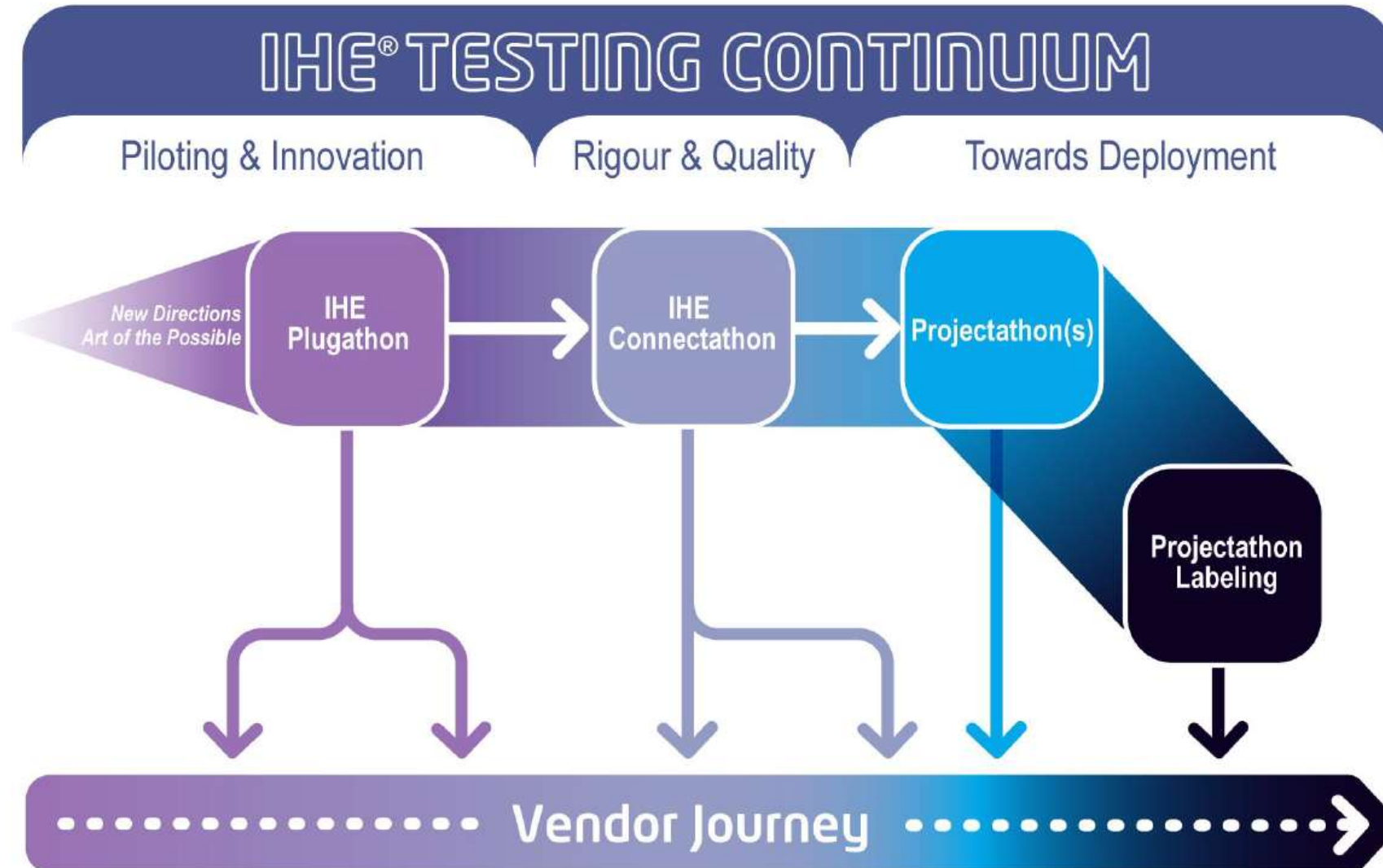
# The Vision: operate in a certified environment



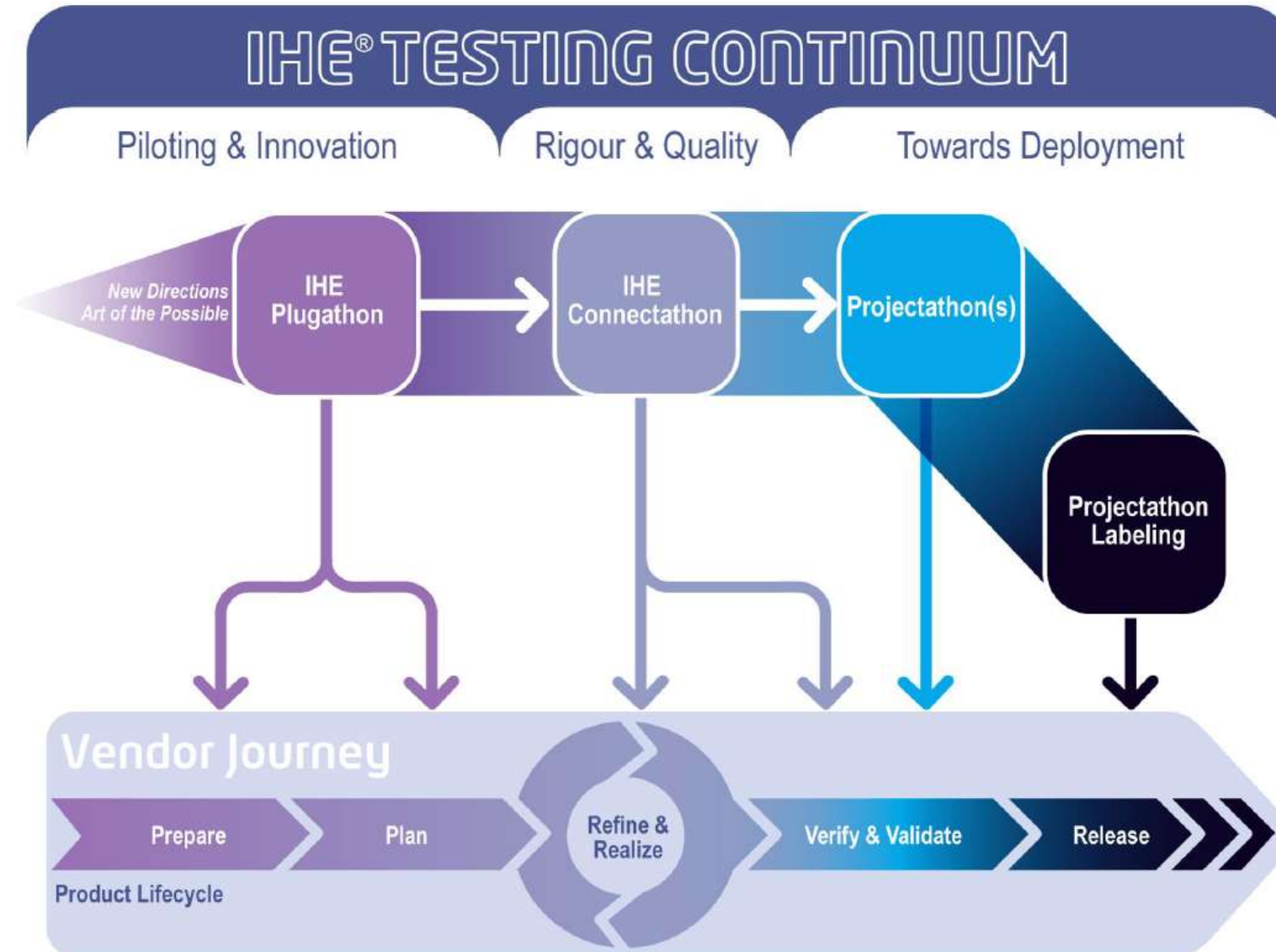
# Why testing?



# Testing Continuum



# Testing Continuum



# IHE Connectathons

## Connectivity Marathons

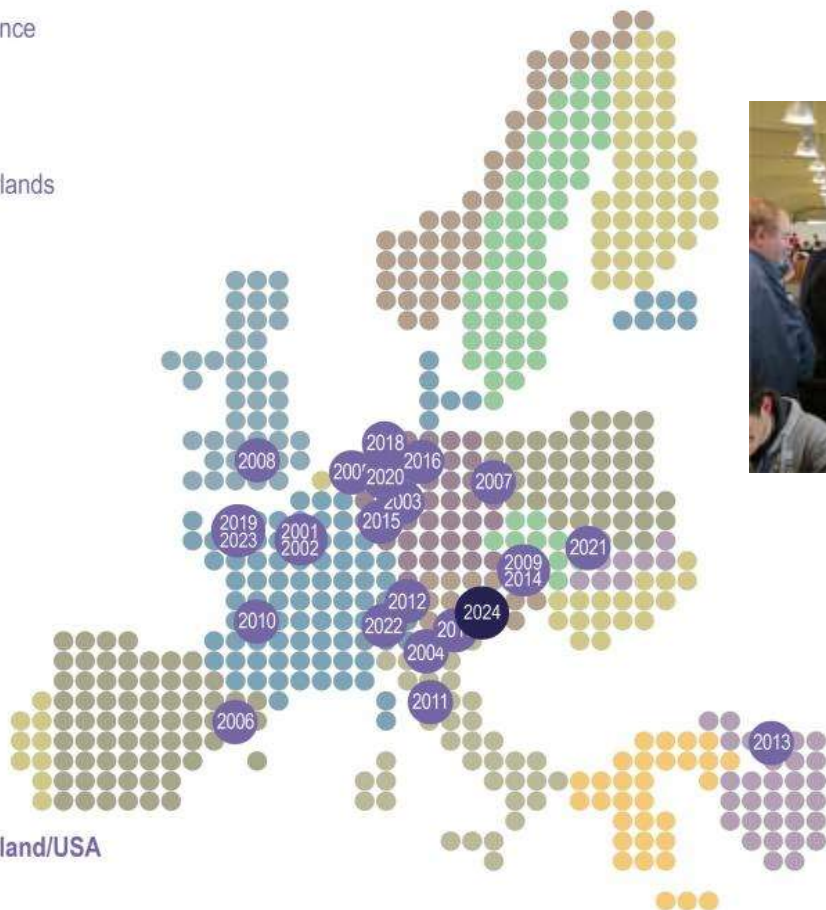
- Open invitation to vendor and other implementers community
- Advanced testing tools (GAZELLE, a GITB platform)
- Testing organized and supervised by IHE technical management team and monitors
- Thousands of cross-vendor tests performed
- Results recorded and published



# IHE Connectathons



- 2001: Charenton-le-pont Paris, France
- 2002: Villejuif in Paris, France
- 2003: Aachen, Germany
- 2004: Padova, Italy
- 2005: Noordwijkerhout, The Netherlands
- 2006: Barcelona, Spain
- 2007: Berlin, Germany
- 2008: Oxford, UK
- 2009: Vienna, Austria
- 2010: Bordeaux, France
- 2011: Pisa, Italy
- 2012: Bern, Switzerland
- 2013: Istanbul, Turkey
- 2014: Vienna, Austria
- 2015: Luxembourg
- 2016: Bochum, Germany
- 2017: Venice, Italy
- 2018: The Hague, The Netherlands
- 2019: Rennes, France
- 2020: Brussels, Belgium
- 2021: Ostrava, Czech Republic
- 2022: Joint Connectathon, Switzerland/USA
- 2023: Rennes, France
- 2024: Trieste, Italy



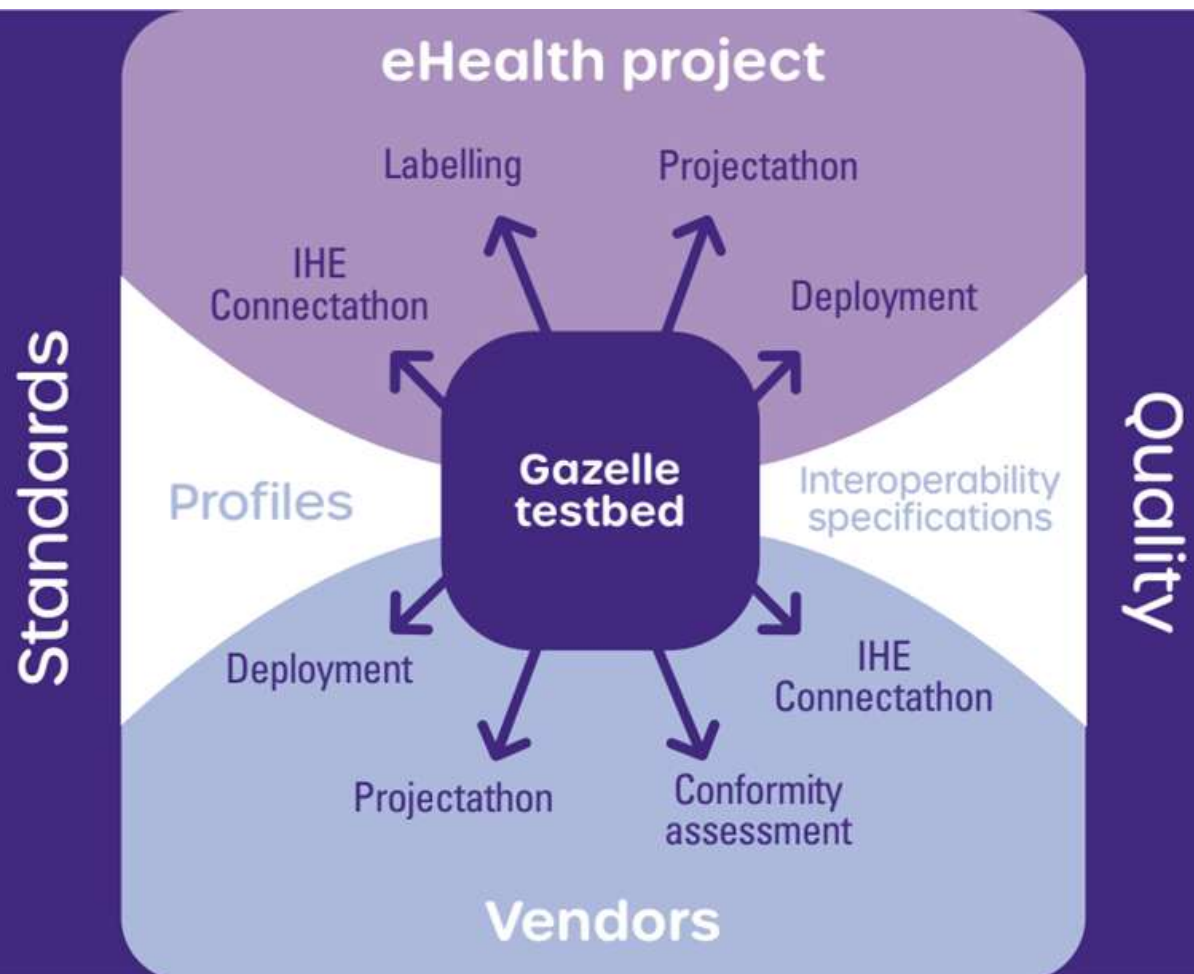
**IHE**® **WEEK**  
EUROPE **CONNECTATHON**  
**VIENNA**   
23-27 JUNE  
**2025**

# So what is Gazelle ?

Gazelle is an **open-source test bed** for „scaled“ interoperability testing

**Gazelle** is an open-source, web-based test platform supporting a wide portfolio of interoperability test tools suited to validate interface conformity to IHE Profiles and project-specific standards-based interoperability specifications.

Vendors can validate their eHealth projects to procure interfaces they deploy.



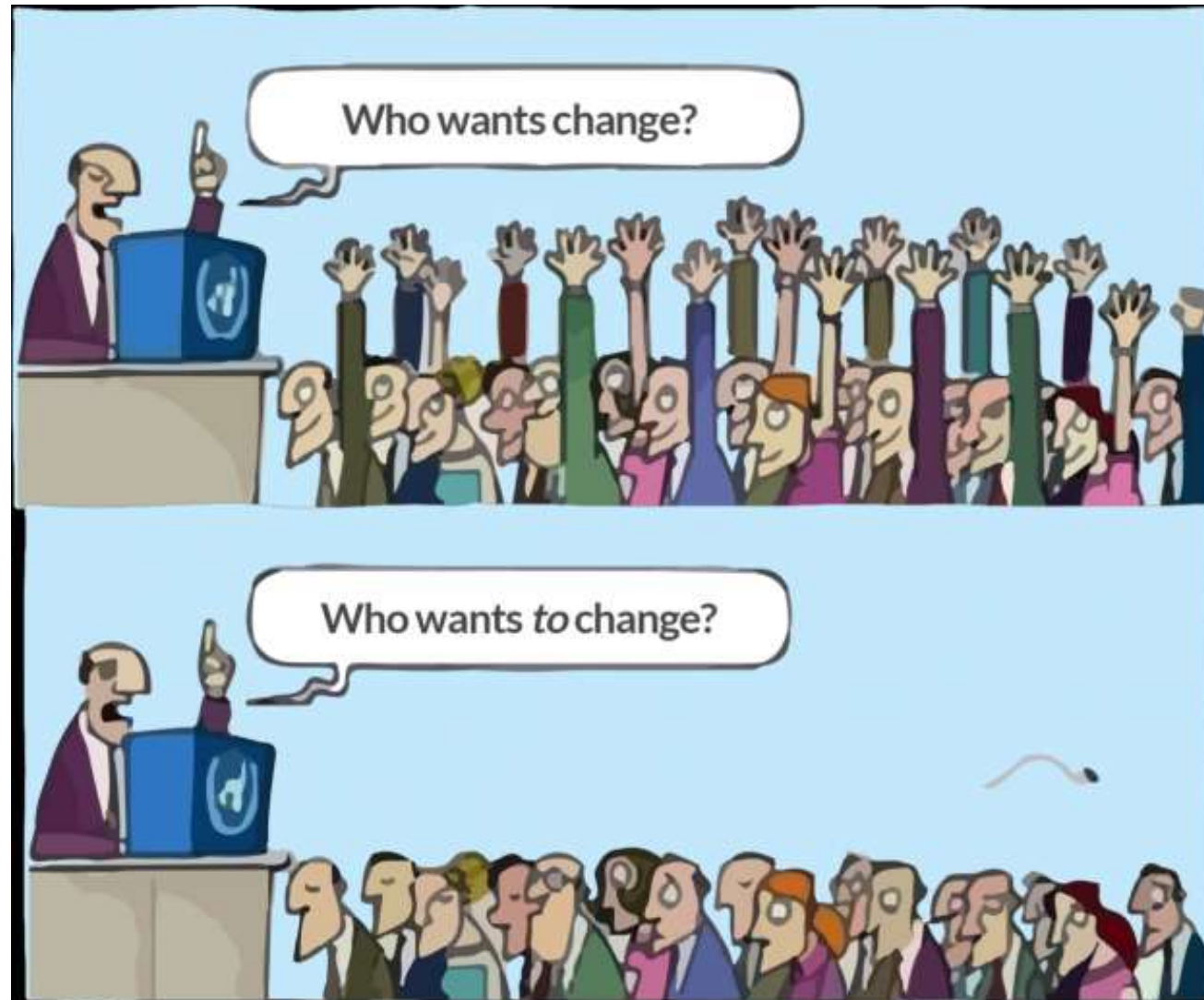
# Examples of Projectathons



# Closing

- Focus on the needed governance for consensus building
- Moving from use case definition to implementation scenarios
- Promote, co-create consensus based specifications and reusability of specifications
- Manage testable interoperability specifications, test and certify

# Realizing Interoperability is about teamwork



# Realizing Interoperability is about teamwork





Questions?



# Thank you!



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